

## PATENT ABSTRACTS OF JAPAN

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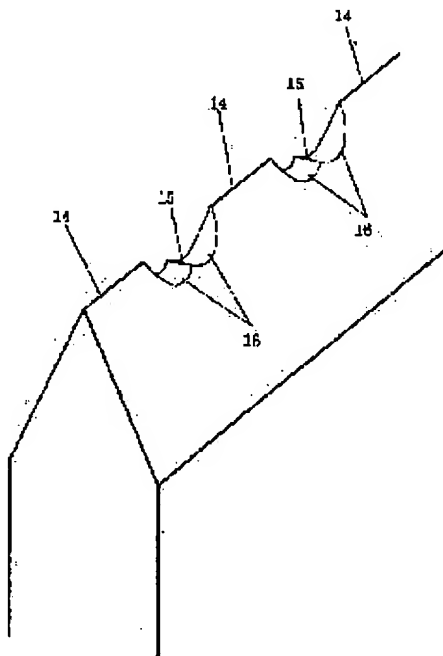
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**(54) PLASTIC SHEET WITH FOLDABLE RULED LINE AND RULED LINE BLADE FOR PLASTIC SHEET****(57)Abstract:**

**PROBLEM TO BE SOLVED:** To make a plastic sheet hardly breakable and a packaging operation using the sheet automatic when the plastic sheet is used as a packaging container by arranging two or more curved projecting crosswise grooves in a direction almost at right angles with the longer direction of a ruled line groove and besides, at an appropriate interval in the longer direction of the ruled line groove.

**SOLUTION:** The ruled line blade is made up of a combination of a longitudinal edge 14, a curved recessed face 16 and a crosswise edge 15. The longitudinal edge 14 is an edge formed in the direction of the ruled line blade (the direction of the length of a blade) and the crosswise edge 15 is an edge formed in a direction almost orthogonal with the direction of the ruled line blade. Since the crosswise edge 15 is present at a deeper position than the longitudinal edge 14, the ruled line nicked by the crosswise edge 15 leaves a thicker residual wall in a plastic sheet compared to the ruled line by the longitudinal edge 14. In addition, the residual wall formed by both crosswise edge 15 and curved recessed face 16 works to suppress an elastic force to restore the residual wall to its original state. Further, the advantage is that the ruled line blade which is capable of meeting whatever kinds of materials may be used by combining the number of the curved recessed faces 16 with the longitudinal edge 14, can be designed.

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CLAIMS

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[Claim(s)]

[Claim 1] The sheet plastic containing a bending ruled line characterized by to form the transverse groove which has the narrow base of one or more numbers formed so much in the direction of an abbreviation right angle of two or more curve heights at said ruled line slot longitudinal direction in the sheet plastic equipped with the bending ruled line of a chamfer which consists of a lateral portion of the pair which inclines at a predetermined include angle and confronts mutually each other, and a narrow bottom surface part in the configuration suitably arranged at spacing to the ruled line slot longitudinal direction [claim 2] The ruled line cutting edge for sheets plastic characterized by approaching and preparing two or more curve crevices in the direction of a right angle from the edge-of-a-blade section to the usual ruled line cutting edge (vertical blade) which has the lateral portion of the pair which inclines at a predetermined include angle and confronts mutually each other, and the narrow top-face section, and the boundary section of said curve crevice forming a horizontal cutting edge.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to a sheet plastic and a ruled line cutting edge equipped with the bending ruled line of a chamfer which consists of a lateral portion of the pair which inclines at a predetermined include angle and confronts mutually each other, and a bottom surface part.

[0002]

[Description of the Prior Art] In order to make the container which bends and forms the sheet of plastics, as shown in drawing 1, the chamfer 2 for bending is formed in the sheet 1 pierced in the configuration which assembles a container, it bends along with the chamfer 2, and a container as shown in drawing 2 is formed. this chamfer 2 — "a bending ruled line" — or it is only called the "ruled line." This ruled line forces and forms the member currently called the "ruled line cutting edge."

[0003] The approach of attaching and bending a ruled line using a ruled line cutting edge is a technique used for formation of a paper carton from the former. However, the drag force to crookedness differs from paper, and since elasticity is also large, it is difficult for a sheet plastic to make the container with which the corner became a right include angle only by attaching a simple bending ruled line like [ in the case of paper ].

[0004] Various devices are made in order to solve such a point. One is making the configuration of a bending ruled line special and raising the bending engine performance. For example, the sheet plastic containing a bend line which formed irregularity in the pars basilaris ossis occipitalis of the concave which forms a bend line along the die-length direction is indicated by JP,4-9345,Y. The sheet plastic containing a bend line which formed the intermittence hole in the pars basilaris ossis occipitalis of the concave which forms a bend line along the die-length direction is indicated by the JP,64-40317,A official report.

[0005] About the bending processing approach of a sheet plastic, the approach of bending and processing it into it, once it returns to it after folding up a sheet in a JP,2-98422,A official report for every ruled line in bending the sheet plastic which formed the ruled line and processing it is indicated.

[0006] Furthermore, the work is carried out also about the structure of the ruled line cutting edge which attaches a ruled line to a sheet plastic. In JP,1-141720,A (patent registration 2541252), it has the shape of tothing to which the edge of a blade is intermittent in the die-length direction as a ruled line cutting edge for sheets plastic, and the ruled line cutting edge for sheets plastic whenever [ tool angle / whose ] the width of face at the tip of 0.02-0.15mm and heights is [ the die length of 0.3-2mm and heights ] less than 0.5mm for the die length of a crevice, and is 30-130 degrees is indicated. The perspective view of this ruled line cutting edge is shown in drawing 3. The heights 4 of the ruled line cutting edge 3 are sharp, and the crevice 5 has become a plane. However, heights 4 do not necessarily need to have the shape of a sharp cutting edge.

[0007] Signs that the ruled line was put into the sheet plastic using this ruled line cutting edge 3 are shown in drawing 4. A sheet plastic 6 pushes and transforms a ruled line cutting edge, and a

ruled line 7 is attached. Although there is almost no reserved meat in the slot 8 made by the heights of a ruled line cutting edge, reserved meat remains in the slot 9 made by the crevice of a ruled line cutting edge.

[0008]

[Problem(s) to be Solved by the Invention] From the newest automatic packer, a sheet is bent at a high speed, a three-dimensional container is made, and contents are loaded with and closed with it. Although the sheet plastic containing a ruled line is created by various devices which were stated with the above-mentioned conventional technique, it bends and a container can be made, it cannot respond to this automatic packer completely. For example, the ruled line section is torn or there are problems, like formation in a solid configuration may go wrong.

[0009] Generally, the property of bending becomes good by making thin thickness (reserved meat thickness) of the pars basilaris ossis occipitalis of the slot of the ruled line section to the board thickness of a sheet plastic. On the other hand, if reserved meat thickness of the ruled line section is made thin, it will bend, and at the time, especially the time of assembly shaping by the automatic packer, it is easy to commit the strong force partially, and there is a problem that a tear occurs from a ruled line part. Especially if this problem is made into the configuration which prepares a hole in a ruled line part partially in order are bending-easy and to carry out, a tear will tend to generate it.

[0010] In case a sheet plastic is used for this invention as a container, it aims at the ability to have had a ruled line of the new configuration which is hard to damage which corresponds to an automatic packer.

[0011]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, in this invention, a transverse groove with the narrow base of one or more numbers formed so much in the direction of an abbreviation right angle of two or more curve heights at a ruled line slot longitudinal direction is formed in the configuration suitably arranged at spacing to the ruled line slot longitudinal direction in the sheet plastic equipped with the bending ruled line of a chamfer which consists of a lateral portion of the pair which inclines at a predetermined include angle and confronts mutually each other, and a narrow bottom surface part.

[0012] Moreover, in order to form such a ruled line, two or more curve crevices shall be approached and prepared in the direction of a right angle from the edge-of-a-blade section to the usual ruled line cutting edge (vertical blade) which has the lateral portion of the pair which a ruled line cutting edge inclines at a predetermined include angle, and confronts mutually each other, and the narrow top-face section, and the boundary section of said curve crevice shall form a horizontal cutting edge.

[0013] By the ruled line strong and performed to paper compared with paper, even if it bends a sheet plastic, it may return to the original condition according to this elastic force. For this reason, when the form of a container etc. is made, there is a possibility that a form may collapse. Therefore, it is with an element important when forming the container with which a ruled line can enter and mold collapse does not carry out the direction, and it becomes important to bend according to the material of a sheet plastic and to design a ruled line.

[0014] The ruled line of this invention serves for a horizontal cutting edge and the reserved meat made by the curve crevice to suppress this elastic force. Furthermore, it has the advantage that the ruled line cutting edge which can respond to any materials with the number of curve crevices and the combination of a vertical blade can also be designed.

[0015]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing. Drawing 5 is the explanatory view showing signs that the sheet plastic containing the ruled line of this invention was seen from the transverse-plane slanting upper part. The ruled line 11 is attached to the sheet plastic 10. The shallow short bottom surface part 13 is formed in the direction which carries out an abbreviation rectangular cross at abbreviation regular intervals to the bottom surface part 12 where the transverse groove was extended to the longitudinal direction of a ruled line slot. The width of face of a bottom surface part is defined according to the size, the quality of the material, etc. of a sheet plastic.

[0016] As the quality of the material of a sheet plastic, a simple substance or compound sheets, such as polyethylene terephthalate, a polyvinyl chloride, and polypropylene, are used. Usually, that whose thickness is 0.1mm – about 1.0mm is used. The instrument into which it bends to this sheet plastic and a ruled line is put is a ruled line cutting edge. The reinforcement of a ruled line part is changeable with the material and thickness of a sheet plastic in the combination of the vertical blade of a ruled line cutting edge, a horizontal cutting edge, and a curve crevice, and each depth.

[0017] Drawing 6 is the perspective view of the ruled line cutting edge which creates the ruled line slot shown in the above-mentioned example. The ruled line cutting edge of drawing is the combination of a vertical blade 14, the curve concave surface 16, and the horizontal cutting edge 15. A vertical blade 14 is a cutting edge attached in the direction of a ruled line cutting edge (the direction of the length of a blade), and the horizontal cutting edge 15 is a cutting edge attached in the direction of a ruled line cutting edge in the direction which carries out an abbreviation rectangular cross. Since the horizontal cutting edge 15 exists in a location deeper than a vertical blade 14, reserved meat with the ruled line thicker than a vertical blade 14 minced with the horizontal cutting edge 15 remains in a sheet plastic.

[0018] Drawing 7 is the example of the ruled line cutting edge in other examples of this invention. In this example, two horizontal cutting edges 15 are continuously located in a line. The number of a horizontal cutting edge, a location, etc. are adjusted according to the quality of the material of a sheet plastic, and thickness.

[0019]

[Example] Drawing 8 of the ruled line cutting edge which minces the bend line of a sheet plastic, and one example shown in 9 are explained. In addition, this drawing is not drawn by the right scale proportional to an actual condition. As shown in drawing 8, a ruled line cutting edge is 1.0mm in height of 0.6mm of a cutting edge, and thickness of a cutting edge. Drawing 9 is drawing which looked at the cutting edge from the side face. Spacing of the deepest part of 1.1mm and a curve crevice of the pitch of a horizontal cutting edge is 0.25mm.

[0020] The height of a cutting edge, the pitch of a horizontal cutting edge, the number of a horizontal cutting edge, etc. are replaceable with the thickness and the quality of the material of a sheet. Therefore, it is clear that this invention's it is not what is restricted to the data of this example.

[0021]

[Effect of the Invention] The description of this invention is easy to design the ruled line cutting edge corresponding to the quality of the material of plastics depending on how to attach a curve crevice, as for the bending ruled line cutting edge of this invention. Moreover, since a vertical blade and a horizontal cutting edge are automatically made only by forming a curve crevice, they are that manufacture of a ruled line cutting edge is easy.

[0022] The sheet plastic had elastic force. Even if a bending ruled line can enter and it bends depending on the direction, it may return to the original condition according to this elastic force. For this reason, when the form of a container etc. is made, there is a possibility that a form may collapse. Therefore, a ruled line can enter, and the direction serves as an important element, when forming the container which mold collapse does not carry out. For that purpose, it becomes important to bend according to the material of a sheet plastic and to design a ruled line. The ruled line cutting edge of this invention serves for the reserved meat made by the horizontal cutting edge and the curve crevice to suppress this elastic force. Furthermore, it has the advantage that the ruled line cutting edge which can respond to any materials with the number of curve crevices and the combination of a vertical blade can also be designed.

[0023] The design of the ruled line cutting edge suitable for the material of various kinds of sheets plastic tends to carry out the ruled line cutting edge of this invention. As for the sheet plastic containing a ruled line of this invention, since the bottom surface part of the ruled line slot which takes the lead in bending is not simply located in a line with one train, partial breakage has the pile effectiveness in breadth. Consequently, also in the automatic packer machine which the comparatively strong bending force commits, the effectiveness that the incidence rate of breakage accident decreased was able to be acquired.

[0024] Since the sharp angle in the ruled line slot formed in the shape of a sheet plastic since the side face of a curve crevice was a curved surface decreases, there is little dispersion of light, a crease cannot be conspicuous easily, and the transparence container which was excellent on the appearance can be formed.

[0025] Moreover, the configuration of a crease becomes complicated, there is no return of a ruled line part by the elastic force of a sheet plastic, and there is effectiveness, like as for the range of adjustment by the ingredient, it is large that the mold collapse when processing it replaces the number of few things and a horizontal cutting edge with etc.

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[Translation done.]

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**TECHNICAL FIELD**

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[Field of the Invention] This invention relates to a sheet plastic and a ruled line cutting edge equipped with the bending ruled line of a chamfer which consists of a lateral portion of the pair which inclines at a predetermined include angle and confronts mutually each other, and a bottom surface part.

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## PRIOR ART

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[Description of the Prior Art] In order to make the container which bends and forms the sheet of plastics, as shown in drawing 1, the chamfer 2 for bending is formed in the sheet 1 pierced in the configuration which assembles a container, it bends along with the chamfer 2, and a container as shown in drawing 2 is formed. this chamfer 2 -- "a bending ruled line" -- or it is only called the "ruled line." This ruled line forces and forms the member currently called the "ruled line cutting edge."

[0003] The approach of attaching and bending a ruled line using a ruled line cutting edge is a technique used for formation of a paper carton from the former. However, the drag force to crookedness differs from paper, and since elasticity is also large, it is difficult for a sheet plastic to make the container with which the corner became a right include angle only by attaching a simple bending ruled line like [ in the case of paper ].

[0004] Various devices are made in order to solve such a point. One is making the configuration of a bending ruled line special and raising the bending engine performance. For example, the sheet plastic containing a bend line which formed irregularity in the pars basilaris ossis occipitalis of the concave which forms a bend line along the die-length direction is indicated by JP,4-9345,Y. The sheet plastic containing a bend line which formed the intermittence hole in the pars basilaris ossis occipitalis of the concave which forms a bend line along the die-length direction is indicated by the JP,64-40317,A official report.

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[0007] Signs that the ruled line was put into the sheet plastic using this ruled line cutting edge 3 are shown in drawing 4. A sheet plastic 6 pushes and transforms a ruled line cutting edge, and a ruled line 7 is attached. Although there is almost no reserved meat in the slot 8 made by the heights of a ruled line cutting edge, reserved meat remains in the slot 9 made by the crevice of a ruled line cutting edge.

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## EFFECT OF THE INVENTION

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[Effect of the Invention] The description of this invention is easy to design the ruled line cutting edge corresponding to the quality of the material of plastics depending on how to attach a curve crevice, as for the bending ruled line cutting edge of this invention. Moreover, since a vertical blade and a horizontal cutting edge are automatically made only by forming a curve crevice, they are that manufacture of a ruled line cutting edge is easy.

[0022] The sheet plastic had elastic force. Even if a bending ruled line can enter and it bends depending on the direction, it may return to the original condition according to this elastic force. For this reason, when the form of a container etc. is made, there is a possibility that a form may collapse. Therefore, a ruled line can enter, and the direction serves as an important element, when forming the container which mold collapse does not carry out. For that purpose, it becomes important to bend according to the material of a sheet plastic and to design a ruled line. The ruled line cutting edge of this invention serves for the reserved meat made by the horizontal cutting edge and the curve crevice to suppress this elastic force. Furthermore, it has the advantage that the ruled line cutting edge which can respond to any materials with the number of curve crevices and the combination of a vertical blade can also be designed.

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[0024] Since the sharp angle in the ruled line slot formed in the shape of a sheet plastic since the side face of a curve crevice was a curved surface decreases, there is little dispersion of light, a crease cannot be conspicuous easily, and the transparence container which was excellent on the appearance can be formed.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] From the newest automatic packer, a sheet is bent at a high speed, a three-dimensional container is made, and contents are loaded with and closed with it. Although the sheet plastic containing a ruled line is created by various devices which were stated with the above-mentioned conventional technique, it bends and a container can be made, it cannot respond to this automatic packer completely. For example, the ruled line section is torn or there are problems, like formation in a solid configuration may go wrong.

[0009] Generally, the property of bending becomes good by making thin thickness (reserved meat thickness) of the pars basilaris ossis occipitalis of the slot of the ruled line section to the board thickness of a sheet plastic. On the other hand, if reserved meat thickness of the ruled line section is made thin, it will bend, and at the time, especially the time of assembly shaping by the automatic packer, it is easy to commit the strong force partially, and there is a problem that a tear occurs from a ruled line part. Especially if this problem is made into the configuration which prepares a hole in a ruled line part partially in order are bending-easy and to carry out, a tear will tend to generate it.

[0010] In case a sheet plastic is used for this invention as a container, it aims at the ability to have had a ruled line of the new configuration which is hard to damage which corresponds to an automatic packer.

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MEANS

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[Means for Solving the Problem] In order to solve the above-mentioned technical problem, in this invention, a transverse groove with the narrow base of one or more numbers formed so much in the direction of an abbreviation right angle of two or more curve heights at a ruled line slot longitudinal direction is formed in the configuration suitably arranged at spacing to the ruled line slot longitudinal direction in the sheet plastic equipped with the bending ruled line of a chamfer which consists of a lateral portion of the pair which inclines at a predetermined include angle and confronts mutually each other, and a narrow bottom surface part.

[0012] Moreover, in order to form such a ruled line, two or more curve crevices shall be approached and prepared in the direction of a right angle from the edge-of-a-blade section to the usual ruled line cutting edge (vertical blade) which has the lateral portion of the pair which a ruled line cutting edge inclines at a predetermined include angle, and confronts mutually each other, and the narrow top-face section, and the boundary section of said curve crevice shall form a horizontal cutting edge.

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[0014] The ruled line of this invention serves for a horizontal cutting edge and the reserved meat made by the curve crevice to suppress this elastic force. Furthermore, it has the advantage that the ruled line cutting edge which can respond to any materials with the number of curve crevices and the combination of a vertical blade can also be designed.

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[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing. Drawing 5 is the explanatory view showing signs that the sheet plastic containing the ruled line of this invention was seen from the transverse-plane slanting upper part. The ruled line 11 is attached to the sheet plastic 10. The shallow short bottom surface part 13 is formed in the direction which carries out an abbreviation rectangular cross at abbreviation regular intervals to the bottom surface part 12 where the transverse groove was extended to the longitudinal direction of a ruled line slot. The width of face of a bottom surface part is defined according to the size, the quality of the material, etc. of a sheet plastic.

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[0017] Drawing 6 is the perspective view of the ruled line cutting edge which creates the ruled line slot shown in the above-mentioned example. The ruled line cutting edge of drawing is the

combination of a vertical blade 14, the curve concave surface 16, and the horizontal cutting edge 15. A vertical blade 14 is a cutting edge attached in the direction of a ruled line cutting edge (the direction of the length of a blade), and the horizontal cutting edge 15 is a cutting edge attached in the direction of a ruled line cutting edge in the direction which carries out an abbreviation rectangular cross. Since the horizontal cutting edge 15 exists in a location deeper than a vertical blade 14, reserved meat with the ruled line thicker than a vertical blade 14 minced with the horizontal cutting edge 15 remains in a sheet plastic.

[0018] Drawing 7 is the example of the ruled line cutting edge in other examples of this invention. In this example, two horizontal cutting edges 15 are continuously located in a line. The number of a horizontal cutting edge, a location, etc. are adjusted according to the quality of the material of a sheet plastic, and thickness.

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EXAMPLE

[Example] Drawing 8 of the ruled line cutting edge which minces the bend line of a sheet plastic, and one example shown in 9 are explained. In addition, this drawing is not drawn by the right scale proportional to an actual condition. As shown in drawing 8 , a ruled line cutting edge is 1.0mm in height of 0.6mm of a cutting edge, and thickness of a cutting edge. Drawing 9 is drawing which looked at the cutting edge from the side face. Spacing of the deepest part of 1.1mm and a curve crevice of the pitch of a horizontal cutting edge is 0.25mm.

[0020] The height of a cutting edge, the pitch of a horizontal cutting edge, the number of a horizontal cutting edge, etc. are replaceable with the thickness and the quality of the material of a sheet. Therefore, it is clear that this invention's it is not what is restricted to the data of this example.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the explanatory view of signs that sheet-plastic expansion was carried out for the containers containing a bending ruled line.

[Drawing 2] It is the explanatory view which assembled the sheet plastic containing a bending ruled line to the package.

[Drawing 3] It is the explanatory view showing the structure of the conventional bending ruled line cutting edge.

[Drawing 4] It is the explanatory view which was put into the sheet plastic with the conventional ruled line cutting edge shown in drawing 3 and in which bending and showing a ruled line.

[Drawing 5] It is drawing from the transverse-plane slanting upper part of an example of the sheet plastic containing a ruled line of this invention.

[Drawing 6] It is the perspective view of an example of the ruled line cutting edge of this invention.

[Drawing 7] It is the perspective view of an example of the ruled line cutting edge of this invention.

[Drawing 8] It is the sectional view of the ruled line cutting edge of the example of this invention.

[Drawing 9] It is the side elevation of the ruled line cutting edge of the example of this invention.

[Description of Notations]

1 Sheet Plastic

2 Chamfer

3 Ruled Line Cutting Edge

4 Heights

5 Crevice

6 Sheet Plastic

7 Ruled Line

8 Slot

9 Slot

10 Sheet Plastic

11 Ruled Line

12 Bottom Surface Part Extended to Longitudinal Direction of Ruled Line

13 Bottom Surface Part of \*\*\*\*

14 Vertical Blade

15 Horizontal Cutting Edge

16 Curve Concave Surface

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[Translation done.]

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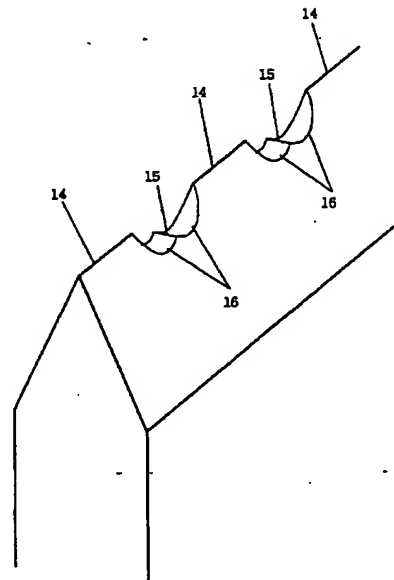
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(54) 【発明の名称】 折り曲げ罫線入りプラスチックシートおよびプラスチックシート用罫線刃

(57) 【要約】

【課題】 プラスチックシートを包装容器として用いる際に、自動包装機に対応するような、破損しにくい新規な形状の罫線を備えたものを得る。

【解決手段】 所定角度で傾斜し相互に対峙する一対の側面部と幅狭の底面部とからなる溝条の折り曲げ罫線を備えたプラスチックシートにおいて、罫線溝長手方向にたいして略直角方向に2以上の湾曲凸部により形成される1以上の本数の幅狭の底面を持つ横溝を、罫線溝長手方向に適宜間隔で配置した形状に形成する。





## 【特許請求の範囲】

【請求項1】 所定角度で傾斜し相互に対峙する一対の側面部と幅狭の底面部とからなる溝条の折り曲げ罫線を備えたプラスチックシートにおいて、前記罫線溝長手方向にたいして略直角方向に2以上の湾曲凸部により形成される1以上の本数の幅狭の底面を持つ横溝を、罫線溝長手方向に適宜間隔で配置した形状に形成したことを特徴とする折り曲げ罫線入りプラスチックシート

【請求項2】 所定角度で傾斜し相互に対峙する一対の側面部と幅狭の頂面部を有する通常の罫線刃（縦刃）に対して、刃先部から直角方向に2以上の湾曲凹部を近接して設け、前記湾曲凹部の境界部が横刃を形成することを特徴とするプラスチックシート用罫線刃。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、所定角度で傾斜し相互に対峙する一対の側面部と底面部とからなる溝条の折り曲げ罫線を備えたプラスチックシートおよび罫線刃に関する。

【0002】

【従来の技術】プラスチックのシートを折り曲げて形成する包装容器を作るには、図1に示すように容器を組み立てる形状に打ち抜いたシート1に、折り曲げるための溝条2を形成しておき、その溝条2に沿って曲げて、図2に示すような包装容器を形成する。この溝条2は「折り曲げ罫線」あるいは単に「罫線」と呼ばれている。この罫線は「罫線刃」と呼ばれている部材を押しつけて形成する。

【0003】罫線刃を用いて罫線をつけて折り曲げる方法は、従来から紙容器の形成に用いられてきた技術である。しかし、プラスチックシートは紙とは屈曲に対する抵抗力が異なり、また、弾性も大きいことから、紙の場合のように単純な折り曲げ罫線を付けただけでは、隅が正しい角度になった包装容器を作ることが難しい。

【0004】このような点を解決するために、様々な工夫がなされている。ひとつは、折り曲げ罫線の形状を特殊なものにして、折り曲げ性能を向上させることである。例えば、実公平4-9345号公報には、折り曲げ線を形成する凹溝の底部にその長さ方向に沿って凹凸を形成した折り曲げ線入りプラスチックシートが記載されている。特開昭64-40317公報には、折り曲げ線を形成する凹溝の底部にその長さ方向に沿って断続孔を形成した折り曲げ線入りプラスチックシートについて記載されている。

【0005】プラスチックシートの折り曲げ加工方法については、特開平2-98422公報に、罫線を設けたプラスチックシートを折り曲げ加工するにあたり、各罫線毎にシートを折り畳んだ後、一旦折り戻してから折り曲げ加工する方法が記載されている。

【0006】さらに、プラスチックシートに罫線を付ける罫線刃の構造についても工夫がされている。特開平1-141720(特許登録2541252)にはプラスチックシート用罫線刃として、刃先が長さ方向に断続する凹凸形状を有し、凹部の長さが0.3~2mm、凸部の長さが0.02~0.15mm、凸部の先端の幅が0.5mm以内であり、刃先角度が30~130°であるプラスチックシート用罫線刃が記載されている。この罫線刃の斜視図を図3に示す。罫線刃3の凸部4は尖っており、凹部5は平面状になっている。ただし、凸部4は必ずしも鋭い刃状である必要はない。

【0007】この罫線刃3を使用してプラスチックシートに罫線を入れた様子を図4に示す。プラスチックシート6は罫線刃を押し付けられて、変形し、罫線7が付けられる。罫線刃の凸部によってできる溝部8にはほとんど残肉がないが、罫線刃の凹部によってできる溝部9では残肉が残る。

【0008】

【発明が解決しようとする課題】最新の自動包装機では、高速にシートを折り曲げて立体的な容器を作り、内容物を装填して、封止する。上記の従来技術で述べたような様々な工夫により罫線入りプラスチックシートを作成して折り曲げ包装容器を作れるようになってきたが、この自動包装機に完全には対応できていない。たとえば、罫線部が破れたり、立体形状への形成に失敗することがあるなどの問題がある。

【0009】一般に、プラスチックシートの板厚に対して罫線部の溝の底部の厚み（残肉厚）を薄くすることで折り曲げの特性が良好となる。一方、罫線部の残肉厚を薄くすると折り曲げ時、とくに自動包装機による組立成形時には部分的に強い力が働きやすく、罫線部分から破れが発生するという問題がある。この問題は、曲げやすくするために罫線部分に部分的に孔を設ける形状にする と特に破れが発生しやすい。

【0010】本発明は、プラスチックシートを包装容器として用いる際に、自動包装機に対応するような、破損しにくい新規な形状の罫線を備えた得ることを目的とする。

【0011】

【課題を解決するための手段】上記課題を解決するために、本発明では、所定角度で傾斜し相互に対峙する一対の側面部と幅狭の底面部とからなる溝条の折り曲げ罫線を備えたプラスチックシートにおいて、罫線溝長手方向にたいして略直角方向に2以上の湾曲凸部により形成される1以上の本数の幅狭の底面を持つ横溝を、罫線溝長手方向に適宜間隔で配置した形状に形成する。

【0012】また、このような罫線を形成するため、罫線刃は、所定角度で傾斜し相互に対峙する一対の側面部と幅狭の頂面部を有する通常の罫線刃（縦刃）に対して、刃先部から直角方向に2以上の湾曲凹部を近接して設け、前記湾曲凹部の境界部が横刃を形成するものとす

る。

【0013】プラスチックシートは紙に比べて弾性力が強く、紙に対して行われているような罫線では、折り曲げてもこの弾性力によって元の状態に戻ることがある。このため、容器などの形を作った場合に、形が崩れる恐れがある。したがって、罫線の入れ方は型くずれのしない容器を形成するうえで重要な要素とであり、プラスチックシートの素材に合わせて折り曲げ罫線を設計することが重要になる。

【0014】本発明の罫線は、横刃と湾曲凹部によってできる残肉がこの弾性力を抑える働きをする。さらに、湾曲凹部の数と縦刃の組み合わせによってどのような素材にも対応できる罫線刃も設計できるという利点を持っている。

【0015】

【発明の実施の形態】以下、本発明の実施の形態を図面を参照して説明する。図5は本発明の罫線の入ったプラスチックシートを正面斜め上方から見た様子を示す説明図である。プラスチックシート10に罫線11がつけられている。横溝は、罫線溝の長手方向にのびた底面部12に対して、略直交する方向に浅く短い底面部13が略等間隔に設けてある。底面部の幅はプラスチックシートのサイズ・材質などによって定める。

【0016】プラスチックシートの材質としては、ポリエチレンテレフタレート、ポリ塩化ビニル、ポリプロピレン、等の単体又は複合シートが用いられる。通常は厚さが0.1mm～1.0mm程度のものが使用される。このプラスチックシートに折り曲げ罫線を入れる道具が罫線刃である。プラスチックシートの素材や厚さによって罫線刃の縦刃、横刃、湾曲凹部の組み合わせと、それぞれの深さなどで、罫線部分の強度を変えることができる。

【0017】図6は上記の例で示した罫線溝を作成する罫線刃の斜視図である。図の罫線刃は、縦刃14、湾曲凹面16、および横刃15の組み合わせになっている。縦刃14は罫線刃の方向（刃渡り方向）につけられた刃であり、横刃15は罫線刃の方向に略直交する方向につけられた刃である。横刃15は、縦刃14よりも深い位置に存在するから、横刃15によって刻まれる罫線は縦刃14よりも厚い残肉がプラスチックシートに残る。

【0018】図7は、本発明の他の実施例における罫線刃の例である。この例では横刃15は2本連続して並んでいる。プラスチックシートの材質、厚さに応じて、横刃の本数、位置などを調整する。

【0019】

【実施例】プラスチックシートの折り曲げ線を刻む罫線刃の図8、9に示す一実施例について説明する。なお、この図は実際の状態に比例した正しい縮尺では描かれていない。図8に示すように罫線刃は刃の高さ0.6mm、刃の厚さ1.0mmである。図9は刃を側面から見た図である。横刃のピッチは1.1mm、湾曲凹部の最深部の間隔は

0.25mmである。

【0020】刃の高さ、横刃のピッチ、横刃の本数などはシートの厚さや材質によって代えることができる。従って、本発明はこの実施例のデータに限るものでないことは明らかである。

【0021】

【発明の効果】本発明の特徴は、本発明の折り曲げ罫線刃は湾曲凹部の付け方によって、プラスチックの材質に対応した罫線刃が設計しやすいことである。また、縦刃および横刃は湾曲凹部を形成するだけで自動的にできるものであるから、罫線刃の製作が容易なことである。

【0022】プラスチックシートは弾性力を持った。折り曲げ罫線の入れ方によっては折り曲げてもこの弾性力によって元の状態に戻ることがある。このため、容器などの形を作った場合に、形が崩れる恐れがある。したがって、罫線の入れ方は型くずれのしない容器を形成するうえで重要な要素となる。そのためには、プラスチックシートの素材に合わせて折り曲げ罫線を設計することが重要になる。本発明の罫線刃は、横刃と湾曲凹部によってできる残肉がこの弾性力を抑える働きをする。さらに、湾曲凹部の数と縦刃の組み合わせによってどのような素材にも対応できる罫線刃も設計できるという利点を持っている。

【0023】本発明の罫線刃は、各種のプラスチックシートの素材に適した罫線刃の設計がしやすい。本発明の罫線入りプラスチックシートは、折り曲げの中心となる罫線溝の底面部が単純に1列に並ばないために、部分的な破損が広がりにくい効果がある。その結果、比較的強い折り曲げ力の働く自動包装機器においても、破損事故の発生率が減少する効果を得られた。

【0024】湾曲凹部の側面が曲面であるため、プラスチックシート状に形成された罫線溝中の鋭い角が少なくなるため、光の散乱が少なく、折れ目が目立ちにくく、外観上優れた透明容器が形成できる。

【0025】また、折れ目の形状が複雑になり、プラスチックシートの弾性力により罫線部分の戻りがなく、加工したときの型くずれが少ないこと、横刃の本数を代えるなど、材料による調整の範囲が広い、などの効果がある。

【図面の簡単な説明】

【図1】折り曲げ罫線入り包装容器用プラスチックシート展開した様子の説明図である。

【図2】折り曲げ罫線入りプラスチックシートを包装用に組み立てた説明図である。

【図3】従来の折り曲げ罫線刃の構造を示す説明図である。

【図4】図3に示す従来の罫線刃でプラスチックシートに入れた折り曲げ罫線を示す説明図である。

【図5】本発明の罫線入りプラスチックシートの一例の正面斜め上方からの図である。

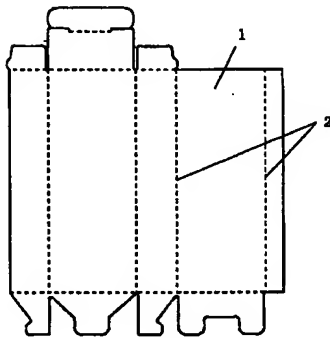
【図6】本発明の罫線刀の一例の斜視図である。  
 【図7】本発明の罫線刀の一例の斜視図である。  
 【図8】本発明の実施例の罫線刀の断面図である。  
 【図9】本発明の実施例の罫線刀の側面図である。

【符号の説明】

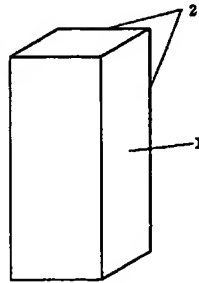
- 1 プラスチックシート  
 2 溝条  
 3 罫線刀  
 4 凸部  
 5 凹部  
 6 プラスチックシート

- \* 7 罫線  
 8 溝部  
 9 溝部  
 10 プラスチックシート  
 11 罫線  
 12 罫線の長手方向にのびた底面部  
 13 浅短溝の底面部  
 14 縦刃  
 15 横刃  
 10 16 湾曲凹面  
 \*

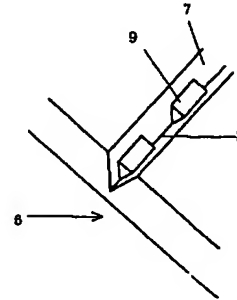
【図1】



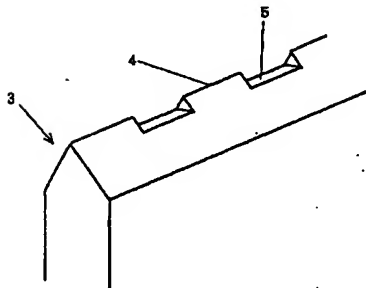
【図2】



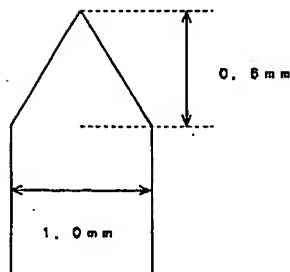
【図4】



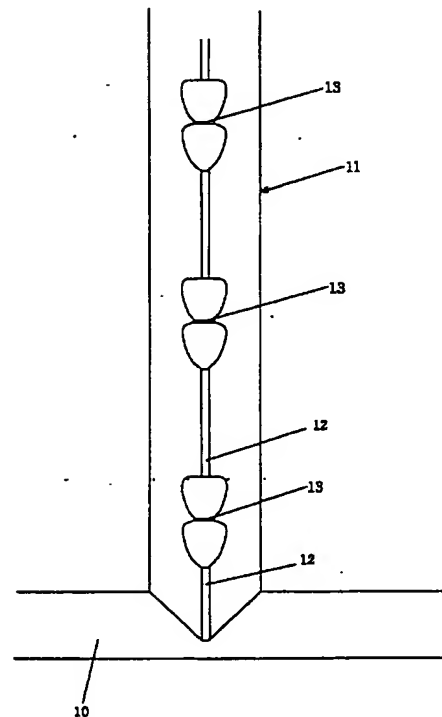
【図3】



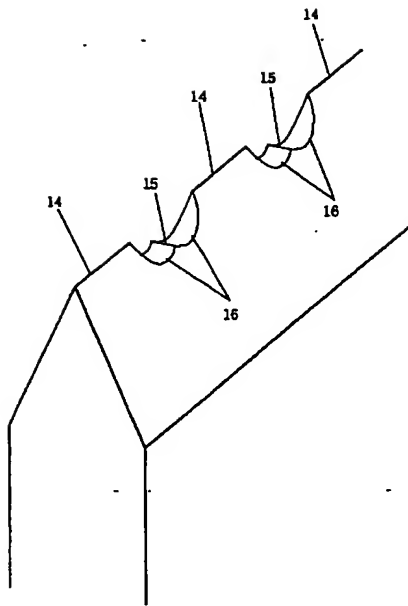
【図8】



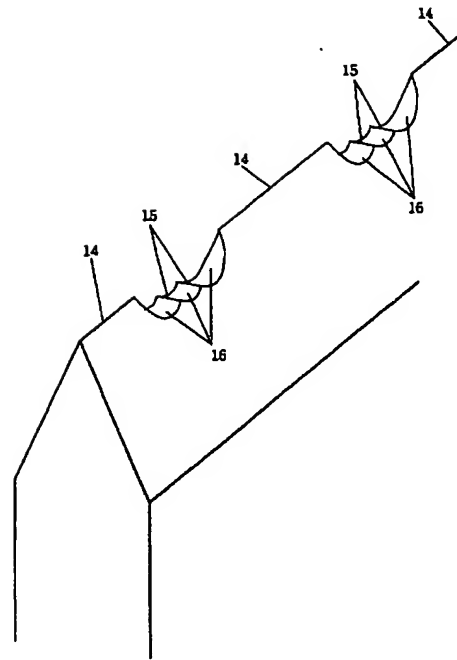
【図5】



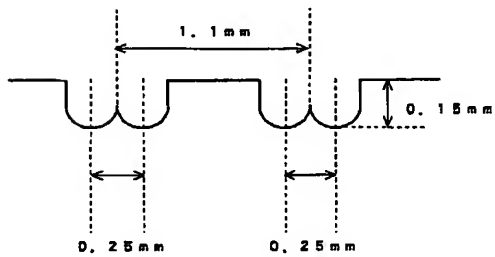
【図6】



【図7】



【図9】



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